

ILLUSTRATED DESCRIPTION

OF THE

BROADWAY

Underground Railway,

WITH

EXPLANATORY DETAILS AND ENGRAVINGS

OF THE

ATMOSPHERIC MACHINERY, PNEUMATIC PASSENGER-CAR,
PNEUMATIC POSTAL DISPATCH, UNDERGROUND
TUNNELING MACHINE, ETC.

NEW-YORK:

PUBLISHED BY THE BEACH PNEUMATIC TRANSIT CO.

1872

THE CHAMPION SPRING BED.

From *Scientific American*, Nov. 4, 1871.

THE sum total of human experience on the subject shows that the bed question is one of great importance to every body, and that upon the wisdom of one's choice of bedding material depends much of comfort, health, and even the prolongation of life. A badly composed bed is too often but the breeding-place of contagion and disease.

Good feathers and curled hair, in abundant quantities, make good beds ; but their organic substance renders them unhealthy, and the best medical authorities discourage their use. A capital substitute for them has been found in the elastic properties of metals, and the subject of our illustration is the very latest improvement in this line—the Champion Spring Bed—which rivals in its softness the old-fashioned down and hair, embodying, likewise, all the good qualities that experience has shown to be desirable.

This bed is composed of eighty-eight beautiful steel springs, comprising over eight hundred coils, drawn and tempered with accuracy, yielding and pliable like watch-springs, the helices united by leather bands, and the whole so arranged that pressure, applied upon any one portion of the surface of the bed, is equally distributed and sustained by all of the springs. This imparts to the bed an even elasticity and general softness, which is a peculiar characteristic, preventing that sinking down of the bed in one spot, and that down-hill feeling of the surface, or sloping toward the place where the greatest weight rests—defects that are common to most of the ordinary spring beds.

Another striking advantage of this bed is its remarkable flexibility. As shown in our engraving, it may be rolled up like a blanket, forming a convenient package for transportation ; and it may be lifted, turned, and carried about the household with the utmost facility.

Its extreme lightness is a distinctive and important quality, the total weight of a first-class double bed being only 25 lbs. A child may carry it ; any woman may lift it with one hand. Housekeepers will appreciate this quality, for they can remove and place the bed wherever they require, as easily as if it were a bolster.

Another excellent feature is its perfect security against corrosion, the springs being inlaid with a firm water-proof fire enamel, which renders the bed serviceable in any climate, hot or cold, dry or damp.

Both sides of the bed are alike, it can be used either side up, has no attached frame of wood or slats, but is soft, yielding, and flexible in every part. In summer-time it forms a cool and luxurious couch ; no under-bed being required, a blanket thrown over its surface being sufficient. In cold weather, a mattress of only half the usual thickness is needed.

This bed is noiseless and durable. It is also economical in price, the full-sized double beds of this pattern being retailed at \$12—the smaller sizes for less. Rolled up for transport, as shown in our engraving, it forms a light, compact bundle of steel springs, which may be sent to any part of the world without risk of damage. Such are some of the merits of this invention, as claimed by the makers, and they appear to be well founded. [See engraving on next page of cover.]

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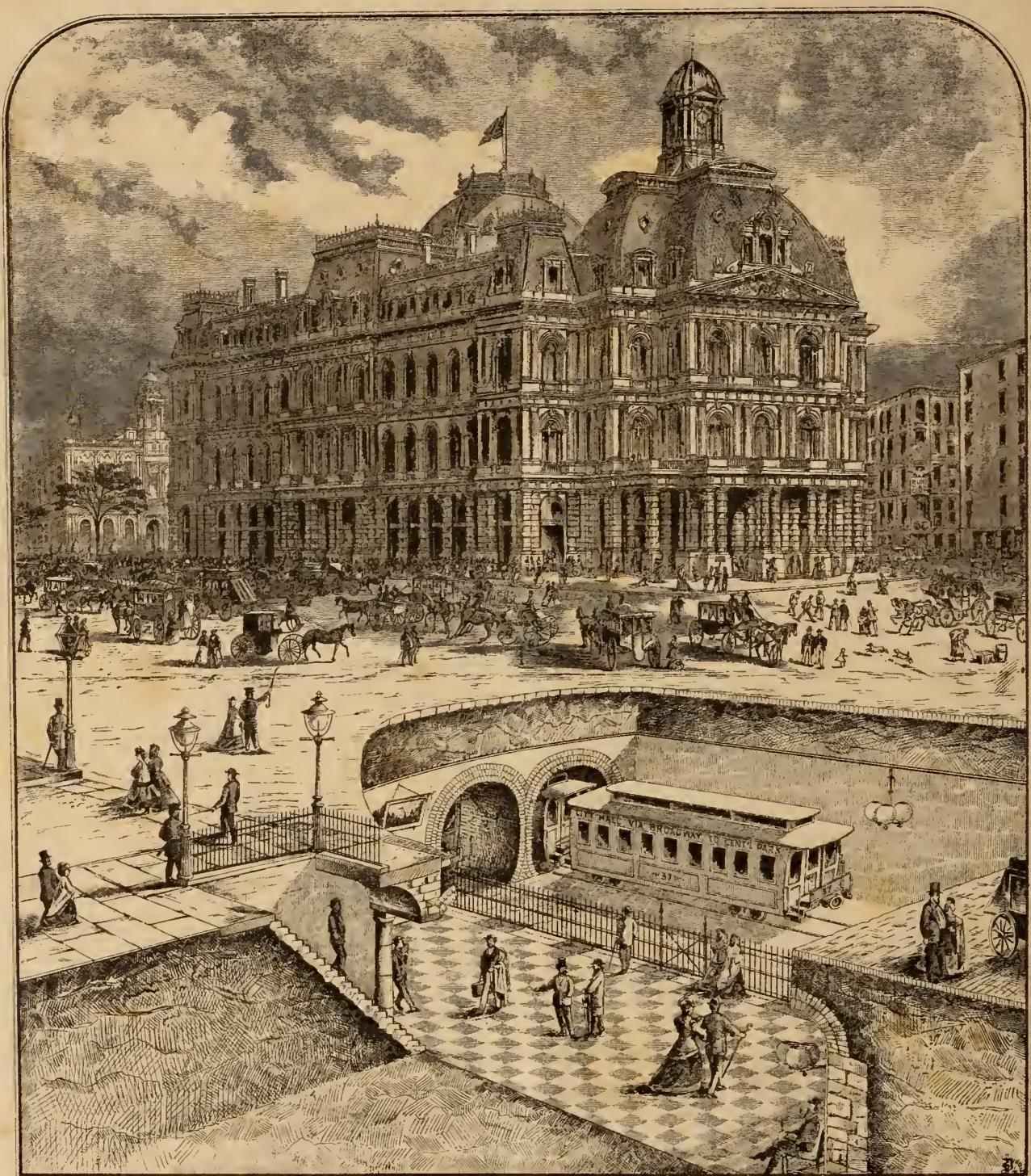


(NEW YORK), 1651.

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VIEW ON BROADWAY NEW YORK

**NEW POST OFFICE
& PROPOSED
BROADWAY UNDERGROUND RAILWAY.**

GENERAL DESCRIPTION

OF THE

BROADWAY UNDERGROUND RAILWAY,

ÆOLOR, TUNNELING-MACHINE, ATMOSPHERIC CARS, PNEUMATIC POSTAL
DISPATCH, ETC., ETC.

THE present experimental section of the Broadway Underground Railway was constructed by the Beach Pneumatic Transit Company, under the provisions of their charters of 1868 and 1869, giving them authority to convey letters, parcels, and merchandise through tubes not to exceed fifty-four inches mean interior diameter. It was ascertained by the company, after careful investigation, that the cost of laying down two tubes of the above size, constructed together, would be but little more than that of building a single tube. It was also ascertained that the quickest and best method of construction for the two tubes was to bore under the streets, below the water-pipes and sewers, and erect a masonry shell or tunnel large enough to inclose both of the fifty-four-inch tubes. It is a portion of this outer tunnel that has been erected; and as it proved to be strong enough and large enough for the transit of passengers, the company laid down therein a railway track and provided a passenger car, for the purpose of temporarily illustrating, by an actual demonstration, the feasibility of placing a railway under Broadway, without disturbance of the street surface or injury to adjacent property.

This experimental section of railway passes below the foundations of some of the heaviest buildings; and although constructed upon a reduced scale, it has proved to be large enough to show, beyond question, that a FIRST-CLASS, DOUBLE TRACK, PASSENGER

RAILWAY MAY BE READILY CONSTRUCTED BY THIS COMPANY, EXTENDING FROM THE BATTERY UNDER BROADWAY TO CENTRAL PARK AND MANHATTANVILLE; WITH BRANCH AT UNION SQUARE, EXTENDING UNDER FOURTH AVENUE TO HARLEM RIVER.

By the construction of this railway our citizens will be enabled to travel between the City Hall and Central Park, West side and Harlem River, in fifteen minutes, riding in comfortable cars brilliantly lighted with gas.

The company only wait the grant of proper legislative authority in order to proceed with this great and important work. The company's application to the Legislature is supported by large numbers of the most prominent citizens of New-York, while their routes and plans are approved by the most eminent architects, civil engineers, and railway constructors.

ENTRANCE AND TICKET-OFFICE.

The present entrance to the Underground Railway is on the west side of Broadway, opposite the City Hall, at the southwest corner of Broadway and Warren streets, through the basement of Devlin's building.

Descending a few steps from the sidewalk, the visitor enters the ticket-office, where the attention is at once arrested by the æolor or blowing-engine, which generates the air-blast by which the pneumatic cars are propelled.

This immense æolor is by far the largest machine of the kind ever made. It consists of a great shell of strong iron, $21\frac{1}{2}$ feet high, 16 feet long, and 13 feet wide, containing two pairs of massive wings, geared together by cog-wheels, and so arranged that the air is drawn in upon one side of the machine, carried through between the wings, and forced out on the other side.

The æolor is capable of discharging over 100,000 cubic feet of air per minute. The machine makes 60 revolutions per minute, and discharges the air through an opening 5 feet square with a velocity of 60 miles per hour.

The upper portion of the æolor, as seen in the ticket-office, is beautifully decorated, and presents no outward indication of being the great reservoir of power we have just described. To

realize this fact, we must go down-stairs and look within its capacious mouths.

Leaving the ticket-office, and passing the æolor on the left, we enter the

WAITING-ROOM OF THE BROADWAY UNDERGROUND RAILWAY.

This is a large and elegantly finished apartment, commencing



INTERIOR OF THE PNEUMATIC PASSENGER-CAR.

at Broadway and extending down Warren street for a distance of 120 feet, built wholly under ground. The walls are adorned with interesting pictures, while comfortable settees, saloons for ladies and gentlemen, and other furnishings, render the place at once cheerful and attractive.

At the east end of the waiting-room we descend a half-dozen steps, and find ourselves upon the railway platform, near the portal of the tunnel, and at the door of

THE PNEUMATIC PASSENGER-CAR.

One of our views shows the interior of the car. It is of circular form, brilliantly lighted, and very comfortable, with seats for 22 persons.

The wheels of the pneumatic car are provided with separate axles and springs. The general construction is such that the floor of the car stands below the axle centres, an arrangement which tends to produce steadiness of motion and security from accident. Powerful brakes are placed at each end of the car, so made that the brake-shoes press upon a central rail, laid on the floor of the tunnel, and thus quickly bring the car to a halt.

One of the advantages of the Pneumatic Railway for city transit is, that the cars may be run either singly or in trains, without additional machinery or cost. The more frequently the cars run the better are the public accommodated. On ordinary steam roads, if the cars are sent singly, a locomotive must accompany each car, which would be expensive; hence, the practice is to run the cars in trains. It is probable that pneumatic cars could, for the same expense, be dispatched through a Broadway tunnel much oftener than locomotive trains could be run.

THE TUNNEL UNDER BROADWAY,

the portal of which, massive and ornamental, of circular form, stands before us as we face the east.

We will follow the railway track into the tunnel, and explore the underground mysteries of Broadway. The rumbling noise of the vehicles which pass in endless procession, directly over our heads, can be distinctly heard.

The tunnel commences at the curb-line of Broadway, and

sweeps on a graceful curve a little beyond the centre line of the street; thence on a straight line down Broadway to a point a little beyond the south side of Murray street. The bed of the tunnel is $21\frac{1}{2}$ feet below the pavement. The interior is painted white; it is lighted with gas; the atmosphere is pure, and a



PORTAL OF THE BROADWAY TUNNEL.

walk through it will be found interesting and instructive. The length of the tunnel is 312 feet, of which the curved portion, 60 feet, is built of iron plates, the interior diameter being 9 feet.

Standing upon the track platform, at a little distance from the tunnel, and looking within the portal, the iron walls, with their net-work of gracefully curved ribs, present a very pleasing appearance. This method of erecting iron tunnels is the invention of Mr. Joseph Dixon, the secretary of the company, long known for his persevering efforts to establish the underground railway in New-York.

The iron track, of the usual T pattern, rests upon longitudinal beams of wood, secured to the brick walls, and fastened cross-wise at intervals by flat girders of cast-iron.

In summer time, the tunnel is the coolest place in the city. When the thermometer stands at 95° at the surface of the street, it indicates only 65° in the tunnel. In winter, the temperature in the tunnel is usually warmer than the external air.

Telegraph wires extend along the walls of the tunnel, which are so arranged in connection with the track that the wheels of the car, when the latter reaches the ends of the tunnel, send back a telegraphic signal to the engineer, who shifts an air-valve, which reverses the air-current and causes the car to move back to its starting-place. Proceeding down Broadway to the end of the tunnel at Murray street, we come to the

GREAT TUNNELING-MACHINE OR SHIELD,

by which Broadway was bored without any body knowing it, with all the omnibuses and other vehicles traveling directly above the heads of the workmen.

We present two views of this novel mechanism, one of which shows the workmen engaged in driving the machine ahead; the other, a perspective interior view, showing the main details of construction. The machine consists of a large cylinder, open at both ends, with the shelves arranged within the front end to receive the earth and prevent it from falling too rapidly into the front end of the machine. X is the bank of earth through which the machine is being pushed. At the rear of the machine, placed around its periphery, is a series of powerful hydraulic rams I, eighteen in number, all connected with a single water-pump A. From the rear of the machine, and passing entirely around it, extends a band of sheet-steel D, two feet wide, and one eighth of



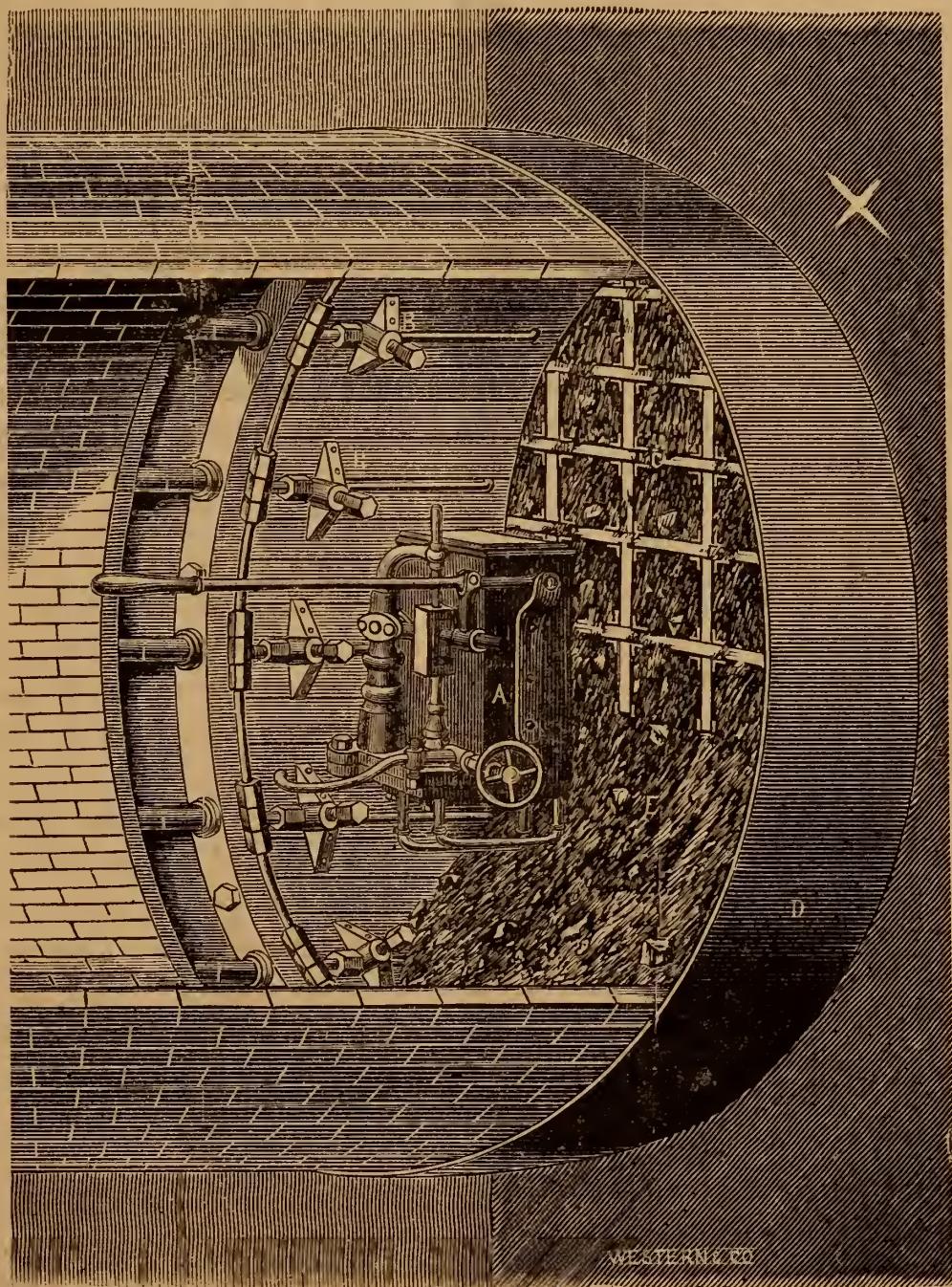
THE UNDERGROUND TUNNELING MACHINE.—DRIVING THE MACHINE AHEAD.

an inch thick, termed the hood. The brick tunnel W is erected within this hood, which at all times covers the end of the masonry, and prevents the earth above from falling upon the workmen. The operation of the machine is as follows: After a section of the brick tunnel sixteen inches long has been erected within the hood, the pump is operated, which causes the rams I to slide out, and push with great force against the front edge of the tunnel, driving the machine forward into the earth X. As the machine advances, the earth presses through between the shelves, and falls down upon the bottom of the machine, whence it is removed in barrows and cars. As soon as the machine has been advanced sixteen inches, its movement is stopped, and a new section of the masonry tunnel is erected within the hood. The machine is then again pushed forward in the manner described. By means of this machine, tunnels of all kinds and sizes may be quickly constructed under rivers, also under the streets of cities, without disturbing the travel of vehicles over the surface. The machine may be readily moved around curves or on grades. By means of the present machine, this railway tunnel was constructed and turned on a radius of 50 feet; the exterior diameter of the tunnel is 9 feet 4 inches. Where tunneling at any considerable depth below the surface is required, the use of this machine saves a large amount of labor. The first machine of this kind, of smaller dimensions, was put in operation under Broadway in 1868, and with it a tunnel of some $5\frac{1}{2}$ feet in diameter was constructed. Its success was so complete that the company determined to construct the large machine shown in our engravings. The machine here illustrated was designed by Mr. A. E. Beach, of the *Scientific American*. In 1869, a similar machine was put in operation in London, and with it a tunnel under the Thames River, known as the Tower Subway, was constructed. This tunnel is 1600 feet in length, extends from Tower hill to Southwark, and was constructed in less than eight months working time.

HOW THE MACHINE WAS STEERED.

The machine was steered around the curve and down Broadway by turning the stop-cocks of the water-pipes belonging to the hydraulic rams, thus changing the pressure from side to side

as occasion required. During the progress of the work under Broadway, the exact course traveled by the machine was determined by compass and survey in the usual manner, and the lines were from time to time verified by driving jointed rods of iron up through the roof of the tunnel to the pavement.



THE UNDERGROUND TUNNELING-MACHINE.

HOW THE CARS ARE OPERATED.

Having presented a general description of the tunnel, the cars, and the aeolor or blowing-machine, we will now briefly describe the manner in which the cars are operated. To do this intelligently, reference should be made to the engraving of the general plan.

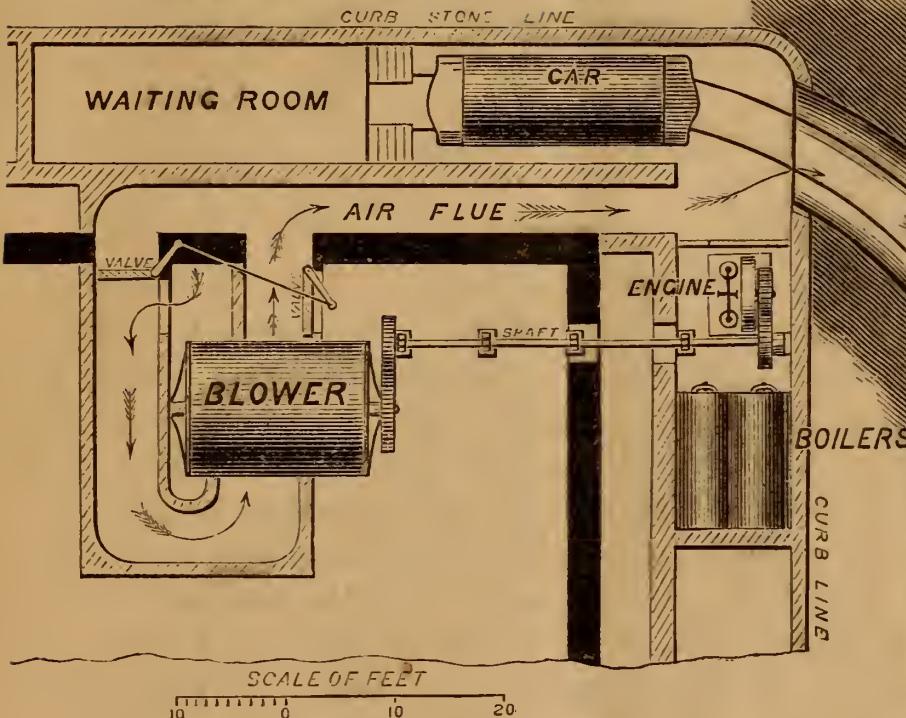
Two air-valves will be noticed, which operate in connection with the air-passages of the blower or aeolor. When the blower is in motion, an enormous volume of air is driven through the tunnel, which drives the car before it like a boat before the wind. On arrival of the car at Murray street, the car-wheel strikes a telegraph connection and sends back a signal to the engineer, who shifts the position of the two air-valves, thereby reversing the air-current by causing the blower to suck the air from the tunnel, and to discharge it into the area-way of the building. In this process of suction, the air is drawn in through a temporary ventilator at the south end of the tunnel, and passes through the tunnel to the blower at Warren street, the passenger-car being swept by the force of the current back to Warren street, where the wheel again strikes the telegraph wire, gives a signal to the engineer, who again shifts the valves, and back the car moves to Murray street.

The mouth of the temporary ventilator is covered by a large iron grating, located on the east side of Broadway, within the grass-plot inclosure of the City Hall Park. A large air-shaft, of masonry, extends obliquely from the grating, passing under the sidewalk and carriage-way to the south end of the tunnel, a distance of 78 feet. When the car is in operation, the alternate discharge and suction of air through the ventilator is readily perceived by persons who approach near to the grating.

The car runs so easily upon the track that only a few grains of atmosphere pressure to the square inch are sufficient to move the car with a considerable velocity.

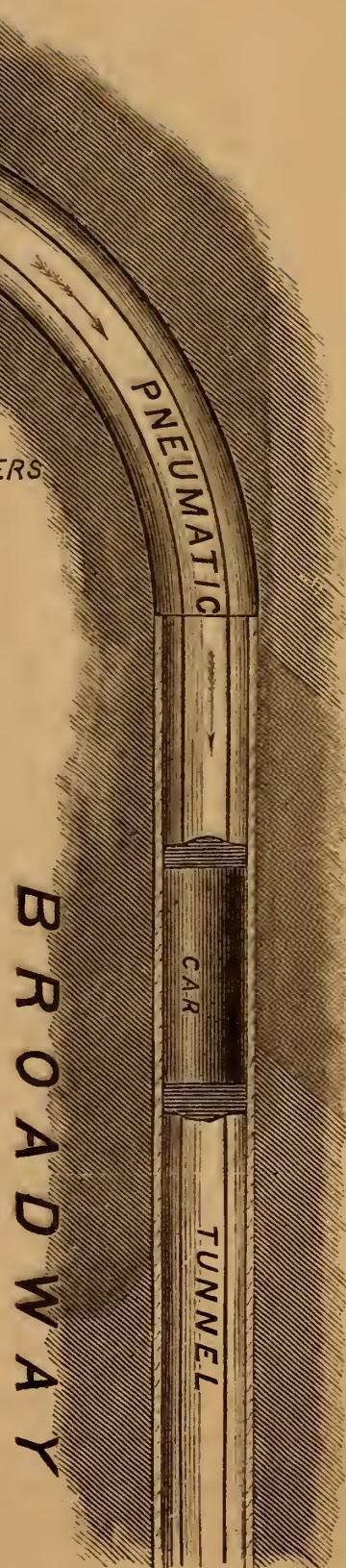
The ride under Broadway is a novel and enjoyable experience. The air is always fresh and pure; there is no dust or other annoyance, and the car moves along with smoothness and rapidity.

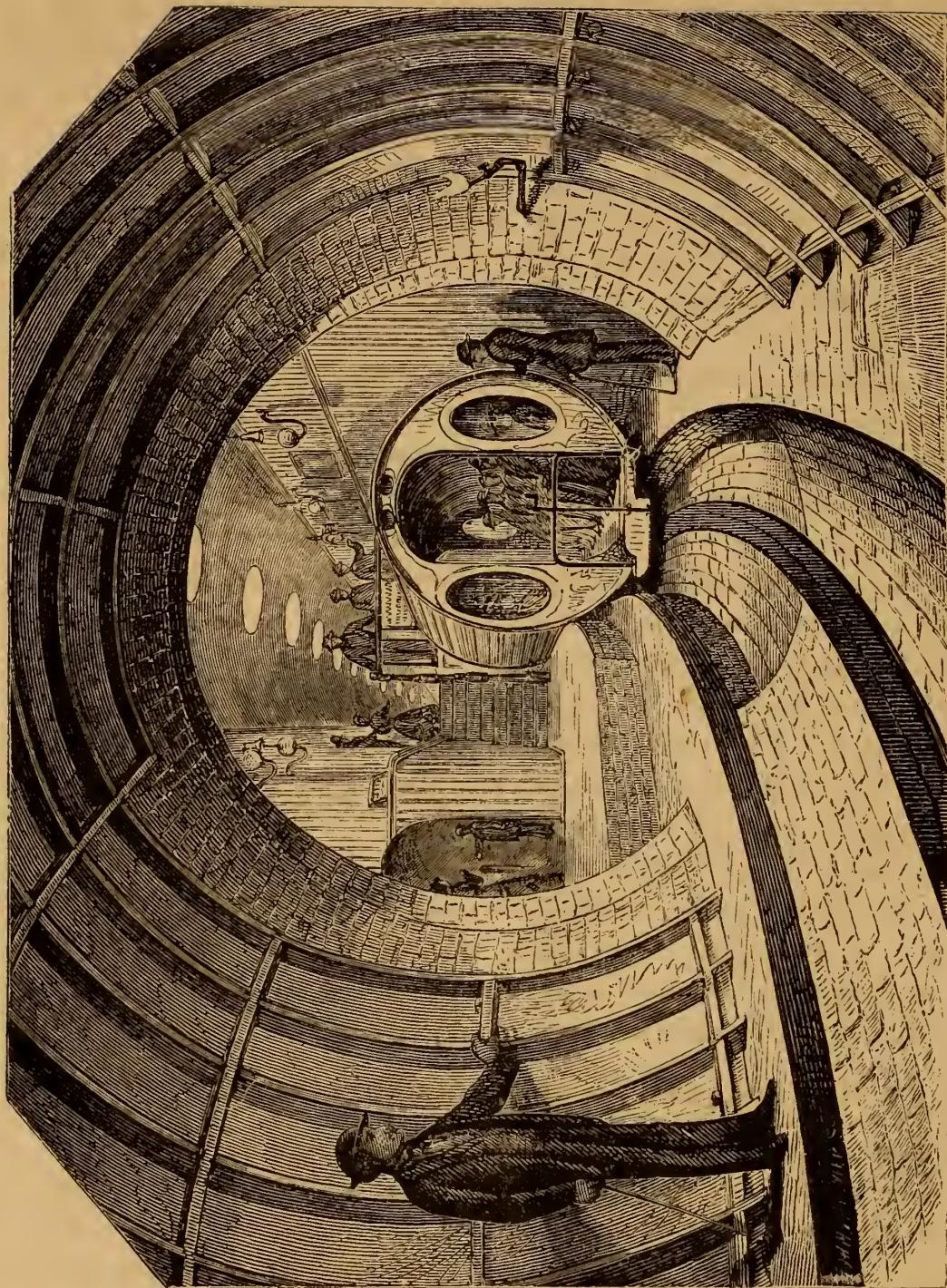
The air presses directly against the end of the car, like a sail-

WARREN S^T

GENERAL PLAN, SHOWING THE ARRANGEMENT OF THE MACHINERY, THE AIR-FLUE, THE TUNNEL, AND THE MODE OF OPERATING THE PNEUMATIC PASSENGER-CAR.

boat before the wind. A car mounted on a track is moved much easier than a boat upon the water, because the vessel encounters great resistance in displacing the water, while the car merely has to overcome the friction of the wheels, which is only one four hundredth part of its weight. Therefore only a small air pressure is required to drive the pneumatic car. Many thousands of persons have enjoyed the atmospheric car-ride under Broadway, and the company's establishment forms one of the most interesting attractions of the city.





VIEW LOOKING FROM WITHIN THE TUNNEL INTO THE STATION.

THE PNEUMATIC POSTAL DISPATCH.

Among other interesting objects to be seen at the Broadway Underground Railway Works is an operating section of the Pneumatic Postal Dispatch.

This consists of a long air-tube, six inches in diameter, which

curves about in various directions, in the sub-basement of the establishment. A receiving letter-box is attached to one end of the tube, and the box is also connected with a blowing-wheel, the arrangement being such that a strong suction of air is maintained through the tube. If, now, any letters, etc., papers or packages, are dropped into the air-tube—for which purpose openings are provided—they are instantly swept along through the tube into the receiving-box, and are there delivered into a suitable receptacle.

The practical operation of this novel apparatus is very interesting to the visitor. The receiving-box is provided with glass sides, so that the ingress of the letters and papers, as they come from the air-tubes, may be readily observed. Letters are sent through at a velocity of from forty to sixty miles per hour.

These postal tubes are designed to be laid under the streets, and to communicate with the various lamp-post letter-boxes and postal stations. The air-current being maintained in the tubes, all letters or packages that may be dropped into the lamp-post boxes will fall into the air-tube beneath, and be instantly swept along to the post-office or nearest postal station.

A complete and effective system of pneumatic city postal collection and delivery has been planned, by which it is believed that letters may be sent from one part of the city to another, within a distance of three miles, in from five to ten minutes. The introduction of such a system would greatly add to the convenience of the public.

THE BROADWAY UNDERGROUND RAILWAY.

The greatest interest in the success and progress of the work has been expressed by the press of New-York, Brooklyn, and adjacent places. The almost universal desire of the press and the people is, that the Legislature will give the company the right to carry passengers, and thus insure the speedy extension of the Underground Railway through the whole length of the city.

The route and plans proposed by this company are the only ones that have ever been generally approved. They entirely meet the wants of the community, and they satisfy the best engi-

neers. *They are undoubtedly the best plans for Rapid City Transit that have been placed permanently before the public.*

We might cover many hundreds of pages with extracts from editorials and reports of the various newspapers commendatory of the Broadway Underground Railway, but our limited space permits us to make only a very few selections:

From Frank Leslie's Newspaper.

THE BROADWAY PNEUMATIC TUNNEL.

The series of engravings pertaining to the Pneumatic Railway which we this week present illustrate the progress of a remarkable work, planned and executed in a remarkable manner. Our great metropolitan thoroughfare has been bored, arched, and a track laid down, by a corps of sappers and miners, who have operated with surprising rapidity and success. They have not only tunneled Broadway, but have done so with the surging throng of humanity, animals, and vehicles marching in endless procession directly above their spades. No outward indications of activity below the ground have been exhibited, and, until quite recently, the public has had no knowledge of the matter. The works are hidden by the granite pavement of the street, and but for our engravings, taken from the subterranean structures themselves, it might be difficult to satisfy our readers that we have above stated only the facts.

The Underground Railroad, the highway for rapid city transit, long needed and pressingly demanded by the inhabitants of New-York, has at last been commenced, and a short portion has been put in actual operation. We trust it will not be long ere we shall be able to chronicle the full completion of the work from the Battery to the Harlem River. It is evident, from the example now before us, that the construction of an underground railway in this city is not a difficult nor, necessarily, a tedious operation. Six months or a year's time is quite sufficient, the ways and means being provided, with enterprising men as conductors.

From the New-York Evening Mail, Feb. 26, 1870.

THE GREAT BORE.

COMPLETION OF THE FIRST SECTION OF THE BROADWAY UNDER-GROUND RAILWAY—A GREAT SUCCESS.

*The problem of tunneling Broadway has been solved. There is no mistake about it. Even as we write, a comfortable passenger-car is running smoothly and safely between Warren and Murray streets, demonstrating beyond contradiction that it is only a question of time and money to give us rapid and comfortable transportation from the Battery to Harlem and back again. Nearly three months ago, the *Evening Mail* was the first journal in the city to announce the existence of this great bore beneath Broadway. In our columns were then described the progress of the work and enough of the plans of the projectors to give a clear idea of what the public were to expect from them. Since then the work has been pushed vigorously on by competent workmen, under a thoroughly competent superintendent, whose name is Dixon. May his shadow increase for evermore! This afternoon, pursuant to invitation, the completed section of the work will be prospected by the mayor, and other members of the city government, and the leading capitalists of the city; and that this visit will be followed by a general hallelujah no sane man doubts, who has sat in that cozy car over twenty feet beneath the surface of Broadway, and been whiffed from Murray street to Warren before he had time to say, "God bless you!"*

* * * * *

We have said that the bed of the tunnel is $21\frac{1}{2}$ feet beneath the surface of the street. It will then be understood that it is below both sewers, and water and gas-pipes, and so far below them as neither to interfere or be interfered with.

The completed section illustrates satisfactorily that there is nothing now to be done but give this company such a charter as will enable them to go on with the passenger-carrying scheme. We can afford to wait awhile longer for the parcel-tubes much better than we can bear the increasing discomforts of the surface railroads.

It is truly most gratifying to see how admirably successful

the affair has been carried out so far, and so quietly as to excite no comment. There is the capacious waiting-room, 120 feet long, for passengers, as perfect in its appropriateness as if it had been the starting-place for up-town for a dozen years. There is the snugly upholstered passenger-car, illuminated with the brilliant lime light, the tunnel nearly 300 feet in length, the engine and the monster fans—all under Broadway, and “nobody a bit the wiser,” one might say.

From the New-York Herald, Feb. 27, 1870.

“UNDER BROADWAY.”

PROPOSED UNDERGROUND RAILROAD—A FASHIONABLE RECEPTION HELD IN THE BOWELS OF THE EARTH—THE GREAT BORE EXPLORED.

“Up Broadway” and “Down Broadway” are familiar routes, familiar not only to Americans residing in New-York, but by description to all the inhabitants of the world. “Under Broadway” for 294 feet, right away, in a thoroughfare well lighted, in a scrupulously clean avenue, is not quite so familiar. Yesterday, hundreds of our citizens, including State officers, members of the Legislature, city officials, and members of the press, walked along a part of Broadway they never were in before, *and more enjoyable than if they had been on the sidewalk of the well-known thoroughfare of the Empire City, instead of 21 feet below it.*

An engraved invitation note asked those who had the good fortune to receive it to attend an “Under Broadway Reception,” at the office of the “Beach Pneumatic Transit Company,” 260 Broadway, from two to six o’clock yesterday.

Descending an ordinary basement “dive,” under Devlin’s clothing store, *the visitors found themselves in a comfortable office, and a few steps lower there was a kind of Aladdin’s cave opened to view, in which there was more to be seen than the eye could take in at once, and therefore we must ask the reader’s attention to a few particulars.*

First of all, let us explain the reason why this descent was

made into the bowels of Broadway, and why all these important representatives of the public had been asked to come and gaze and wonder. Legislative power has been obtained to construct a pneumatic tube-way from Warren street to Cedar street, for the purpose of "blowing" small and large parcels—indeed, all kinds of "express business"—between these two localities. *The promoters had not proceeded far with their work before they discovered that it would be very little more expense to construct an underground railroad for the "blowing" of passengers as well as freight. Acting upon this hint, they have applied to the Legislature for power to construct this underground railroad; and if the calm, settled, and earnest approval of their plan by the representatives of the scientific and executive ability of the city be an earnest of their success, it will not be difficult to obtain the sanction of the Legislature to their bill. Virtually, therefore, yesterday's reception was the opening-day of the first underground railway in America.*

THE TUNNEL AND THE BORE.

The length of the tunnel already open is 294 feet; the iron portion of it is 57 feet; the brick, 237 feet. It is whitewashed and lighted with gas, has telegraphic wires running alongside the wall, is about 12 feet high, and formed a very pleasant promenade. The roar of the Broadway traffic was plainly heard overhead, and, until the ear got familiar with it, sounded very strangely. This 294 feet takes the tunnel to Murray street, on the south side, nearly flush to the post-office fence.

The visitor to the tunnel is shown very clearly how this tunnel has been made, and how it is that the work has been carried on in a mole-like manner without attracting the observation of the Broadway pedestrians, and without interfering in any degree with the traffic. Having first obtained an entrance from the surface in Warren street, and gone deep enough to be out of the way of sewers, gas and water-pipes, a cylinder was introduced, which in shape resembled a barrel with the ends out, forced by 18 hydraulic rams. This forces itself through the earth, and to moderate the fall of the earth, a number of wooden shelves are placed within the cylinder for the earth to drop through; and as the

earth deposits itself, it is shoveled up and carted away. In the course of the travels of this cylinder, it came upon the remains of an old stone building, which was believed to be an old Dutch powder-magazine. The stones were not too large to come through the shelves, and they were carted away with the earth. The cylinder has a projection in the front of it of steel, both broad and sharp, that finds no difficulty in cutting its way along. In the rear of it, there is a thin piece of sheet-iron, 16 inches broad, upon which the brick-work of the tunnel is built up ; and when finished, the cylinder moves on again its earthy way, to have 16 more inches of brick-work added.

From the New-York Times, Feb. 27, 1870.

THE BROADWAY TUNNEL.

OPENING THE BORE TO PUBLIC INSPECTION — SUCCESS OF THE
UNDERTAKING — GREAT CROWD OF VISITORS.

CERTAINLY the most novel, if not the most successful, enterprise that New-York has seen for many a day is the Pneumatic Tunnel under Broadway. A myth or a humbug it has hitherto been called by every body who has been excluded from its interior ; but hereafter the incredulous public can have the opportunity of examining and judging of its merits. *Yesterday the tunnel was thrown open to the inspection of visitors for the first time, and it must be said that every one of them came away surprised and gratified.* Such as expected to find a dismal and cavernous retreat under Broadway, opened their eyes at the elegant reception-room, the light, airy tunnel, and the general appearance of taste and comfort in all the apartments ; *and those who entered to pick out some scientific flaw in the project, were silenced by the completeness of the machinery, the solidity of the work, and the safety of the running apparatus.*

The entrance to this tunnel is on Broadway at the corner of Warren street. At the bottom of the steps is the entrance to an office, and the apartment of the "rotary blower," a huge paddle-box-like affair, neatly frescoed on the outside. To the right a door leads into a long hall, down a few more steps, and directly

under the Warren street sidewalk, which is the "depot" of the establishment, and is handsomely fitted up with a fountain, paintings, and seats. This hall opens toward Broadway to the tunnel, at the entrance of which stands a car ready for passengers. Adjoining the depot is the machinery for pumping the air in and out of the tube, which is worthy of an examination. The tunnel-way itself, how it looks, how it is bored out, has been so often described in the various daily journals that only a brief account of it need be given here. The tube is 8 feet in diameter, arched all the way round with brick painted white. From the bottom of it to the surface of Broadway is 21 feet, and it is therefore below all pipes and sewers. After curving around the corner of Warren street, the tube is perfectly straight. On the bottom is a track about 4 feet wide. The car which runs upon this is about half as large as a street-car, cushioned, lighted, ventilated, and elegant in all its appointments. The contrivance that bores out the tube is a huge iron cylinder, sharp at the end penetrating the earth, and is forced along by hydraulic pressure. The dirt is then shoveled out. So far—the tube now being complete 120 feet, or as far as the south side of Murray street—the excavation has been through sand only, and not a difficult matter. Yesterday, the gentlemanly engineer of the company explained the whole construction of the tunnel, over and over again, to the visitors that kept coming and going.

Such, in brief, is a description of the various compartments of the mysterious underground Broadway tunnel, begun but a few months ago. The enterprise is controlled by the " Beach Pneumatic Transit Company," who propose to run their tunnels in every direction eventually, and make rapid communication between distant parts of the city. They claim that their cars can run one mile a minute with perfect safety by the pneumatic process.

The opening yesterday afternoon was a very pleasant " occasion." It is was intended specially for dignitaries, legislators, aldermen, scientific men, and members of the press, and scores of them were present. Mr. Beach himself was conspicuous, making his visitors explanations, and entertaining them like princes. Judge Daly, members of the American Institute, city officials,

and many prominent citizens were observed among those who came. In the "depot," or reception-room, a first-class subterranean lunch was served continuously from two o'clock until six o'clock, and was continuously appreciated. The "health" of the tunnel was not forgotten. At nightfall, the unique occasion was over, but the "Transit Company" had made *a host of friends and supporters.*

From Harper's Weekly, March 12, 1870.

UNDER BROADWAY.

THE Pneumatic Tunnel, now in process of construction under the principal thoroughfare of New-York, commences in the sub-basements of the spacious marble building of Devlin & Co., corner of Broadway and Warren street, and extends, at present, to a point a little below Murray street. One of our illustrations on this page gives an interior view of the tunnel, looking south from near the entrance. It is 8 feet in diameter, built of solid masonry, is dry and clean, painted white, and lighted with gas. The tunnel passes under all the gas and water-pipes and sewers; but, though so far below the surface of the street, the rumbling of wheels and the tramp of horses overhead can be distinctly heard by one standing within it.

The tunnel is constructed by means of a shield, consisting of a strong cylinder, something like a barrel with both heads taken out. It is pushed forward by 18 powerful hydraulic rams, and makes a bore of its own diameter through the sand. The loosened sand, as it falls through the rear end of the cylinder, is carried back through the tunnel in cars, and delivered upon an elevator on Warren street, where it is raised to the pavement and carted away. As fast as the cylinder advances, the tunnel is arched with masonry. By means of this machine, which was designed by Mr. A. E. Beach, the tunnel is pushed forward without any interruption to the business of Broadway.

Another of our illustrations shows the mouth of the tunnel and a passenger-car, as seen from the station, which is a nicely-finished underground apartment 120 feet in length, lighted from the Warren street sidewalk. Another illustration shows the interior of

the passenger-car, which carries 18 passengers, has very comfortable seats, and is lighted with oxyhydrogen gas. The cars are



BROADWAY UNDERGROUND RAILWAY—THE EXPERIMENTAL SECTION.

to be propelled by the atmospheric system, consisting in driving through the tunnel a strong blast of air, which presses against the rear of the car and carries it along like a sail-boat before the wind. This air-current of course secures perfect ventilation within the car. The air is driven into the tunnel by means of an immense blowing-engine operated by steam. Mr. Joseph Dixon, long known for his efforts to establish the underground railway, is the superintendent of the work.

As soon as the necessary authority can be obtained from the Legislature, it is the intention of the company to proceed to construct a first-class underground railway, with large cars, to run from South-Ferry under Broadway to Central Park, and above that point; together with a Fourth Avenue branch to Harlem River. They will be able, when their arrangements are complete, to transport more than 20,000 passengers per hour each way.

From the New-York Post, Feb. 26, 1870.

THE PNEUMATIC TUBE.

A RECEPTION UNDER BROADWAY.

FOR the first time in the history of New-York a reception with all the accompaniments of furnished saloons, champagne, and salads, was held under Broadway this afternoon.

The following invitation was issued a few days ago:

“ UNDER BROADWAY RECEPTION.

“ *To State Officers, Members of the Legislature, City Officials, and Members of the Press :*

“ You are respectfully invited to be present on Saturday, February 26th, 1870, from two to six o'clock P.M., at the office of the Beach Pneumatic Transit Company, 260 Broadway, corner of Warren street.

“ *JOSEPH DIXON, Secretary.*

“ *A. E. BEACH, President.*”

Owing to the lateness of the hour, we are able to give but a general outline of the enterprise.

On descending the steps at the corner of Warren street and Broadway, the visitor finds himself in a neatly oil-clothed room, on the left of which appears the top of the rotary blower neatly

painted. Advancing a few steps, the visitor turns to the right and descends three more steps, when he finds himself in a handsome and brilliantly-lighted saloon. In the centre is a fountain with jetting water and gold-fishes swimming in the basin. The ceilings and side walls are hard-finished, and with neat striping about the gas-brackets, present an attractive appearance. The floor is covered by oil-cloth, and the windows are hung with damask curtains and cornices. The subbase is of alternate stripes of walnut and white-pine, and about the room are arranged settees and easy-chairs. A piano also adds to the attractiveness of the apartment.

Having reached this floor, the guest turns toward the City Hall Park, and descending another flight of steps, finds himself at the entrance of the tube, in full view of the vast machinery to be used for propelling the cars.

The top of the tunnel is surmounted by a keystone of pressed brick, over which are the letters in German text, "Pneumatic (1870) Transit," and encircling this is a row of gas-jets, covered by alternate globes of red, white, and blue. At either side, on a pedestal, are bronze figures upholding a cluster of gas-lights.

The next feature which strikes the spectator is the graceful curve of the tube into Broadway. The curved arch is supported by iron plates, and after a straight line is reached, the tunnel is continued down Broadway by arches of brick. The interior is painted white, and the entire length is lighted by gas. The track is supported by a bracing of hard wood.

The present length of the tunnel is 294 feet and 6 inches, and fifty-eight days and ten hours were consumed in constructing it. The track is 21 feet under the surface of Broadway, and the only circumstance which would indicate that the visitor is under a busy thoroughfare is the constant rumbling of vehicles overhead. The car is built to conform to the shape of the tunnel, being semicircular in form. It has comfortable accommodation for 20 persons. The machinery is of immense power, and of very fine workmanship.

The visitors to-day were handsomely entertained by the officers of the company.

From the Express, Nov. 18, 1870.

THAT "BORE."

By this system of traveling, the cars are impelled by compressed air only. The air is uncontaminated by dust or gas, the track is not crushed or damaged by heavy locomotives, and all the discomforts of steam travel through tunnels are eliminated.

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From the New-York Herald, Dec. 2, 1870.

SECRETARY ROBESON UNDER GROUND.

THE Secretary of the Navy, accompanied by Admiral Smith and a distinguished party of ladies and gentlemen, visited the Broadway Underground Railway yesterday morning, and rode back and forth under Broadway by atmospheric pressure. *The secretary was much gratified with the success of this simple method of locomotion, examined every part of the novel machinery with great interest, and expressed the hope that the system would soon be extended throughout the city.*

After the riding, he visited the air-chamber of the great blowing-machine and enjoyed personal experience of the mechanical hurricane which sweeps under Broadway and gives motion to the car.

The Pneumatic Postal Dispatch was then set in operation, and the secretary witnessed the transmission of a large mail of letters and newspapers, at a velocity of sixty-three miles an hour, through the atmospheric pipes. The velocity is so great that the letters look like mere specks as they issue from the air-tube into the receiving-box, and it is only when the hopper at the bottom is opened and the letters drop out, that the fact of such rapid transit is realized.

These tubes, it will be remembered, are to be placed under the streets in connection with the lamp-post letter-boxes, the arrangement being such that all letters when deposited in the boxes will slide down into the tubes and be instantly carried forward by the air-current to the post-office or sub-post-office. This will effect a great saving of time in the collection and delivery of city letters.

THE CHAMPION SPRING MATTRESS

Sold Wholesale and Retail by F. C. Beach & Co., 260 Broadway, cor. Warren St., New-York.

SEE PRECEDING PAGE FOR DESCRIPTION.



THE
Mutual Benefit Savings Bank,



166 Nassau Street,

SUN BUILDING.

Opposite the City Hall, New-York.

Six per Cent Interest Allowed,

Commencing on the **First of every Month**, with participation in the profits on the **MUTUAL** plan.

ON SPECIAL DEPOSITS

Interest is paid on daily balances.
and checks paid at sight.

Persons residing in the country can send deposits by express, draft, money order, or registered letter, and a book will be sent as requested. One Dollar will commence an account. Send for a Circular.

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CHARLES K. GRAHAM, President.

A. L. PRITCHARD, } Vice-Presidents.
RICHARD VOSE, }

G. H. BENEDICT, Secretary.

THEO. W. MORRIS, Chairman Exec. Com.

H. EDWIN TREMAIN, Counsel.

TRUSTEES.

JAMES TURNER, Turner Bros., Bankers, corner Pine and Nassau Streets.

SILAS C. HAY, Bunker and Broker, 80 Broadway and 7 New Street.

A. L. PRITCHARD, See. and Treas. Chicago and Northwestern R. R. Co., 52 Wall Street.

RICHARD VOSE, Vose, Dinsmore & Co., Car-Spring Manufacturers, No. 1 Barclay St.

THEO. W. MORRIS, D. S. Schanck & Sons, Glass Importers, 27 Chambers Street.

MARTIN B. BROWN, M. B. Brown & Co., Printers, 201 and 203 William Street.

CHARLES K. GRAHAM, Civil Engineer and City Surveyor, 119 Broadway.

GEORGE W. WHITE, Firm of Charles White & Co., foot of West 40th Street.

NOAH A. CHILDS, Water Purveyor, Department of Public Works, 235 Broadway.

LORING IRGERSOLL, Ingersoll, Watson & Co., Chair Manufacturers, 71 Bowery.

JOSEPH DIXON, Secretary Beach Pneumatic Transit Co., Broadway, corner Warren St.

J. P. DINSMORE, Manufacturer and Proprietor Medicines and Carter's Ink, 36 Dey Street.

H. EDWIN TREMAIN, Tremain & Tyler, Attorneys-at-Law, 167 Broadway.

G. H. BENEDICT, Secretary, 166 Nassau Street. At the Bank from 10 A.M. to 3 P.M., daily.

EVERETT H. KIMBARK, M.D. Residence, 313 East 19th Street.

JAMES O. WEST, West, Bradley & Cary Manufacturing Co., 364 Broadway and 233 West 29th Street.

COURTLANDT PALMER. Office, No. 858 Broadway; Residence, 247 Madison Avenue.